

SEQUENCE LISTING

<110> Rondon, Isaac J
Ladner, Robert C

<120> BINDING PEPTIDES FOR CARCINOEMBRYONIC ANTIGEN (CEA)

<130> Sequence Listing DYX-016.1 US

<140> (not yet assigned)

<141> 2001-04-03

<150> US 09/541345

<151> 2000-04-03

<160> 151

<170> PatentIn Ver. 2.1

<210> 1

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: CEA binding
polypeptide

<220>

<221> VARIANT

<222> (1)

<223> Xaa is Asn, Asp or is absent

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<221> VARIANT

<222> (2)

<223> Xaa is Trp

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<221> VARIANT

<222> (3)

<223> Xaa is Asp, Phe or Val

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<221> VARIANT

<222> (5)

<223> Xaa is Asn, Glu or Met

<220>
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 <222> (6)
 <223> Xaa is Asn, Leu, Met or Phe

<220>
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 <223> Xaa is Asp, Gly, Ile, Lys, Phe or Thr

<220>
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 <223> Xaa is Ala, Trp or Tyr

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<220>
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<220>
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 <222> (15)
 <223> Xaa is Arg, Leu Pro or Ser

<220>
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<223> Xaa is Leu, Ser, Trp or Tyr

<400> 1

Xaa Xaa Xaa Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Cys Xaa Xaa Xaa
1 5 10 15

<210> 2

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: family of
preferred CEA binding moieties

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<223> Xaa is Asn or Asp

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<222> (6)

<223> Xaa is Ph, Met, Leu or Asn

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<223> Xaa is Arg, Leu, Pro or Ser

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<223> Xaa is Leu, Ser, Trp or Tyr

<400> 2

Xaa Trp Val Cys Glu Xaa Xaa Lys Xaa Gln Trp Xaa Cys Asn Xaa Xaa
1 5 10 15

<210> 3

<211> 10

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding
loop

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<222> (9)

<223> Xaa is Ala, Gly, His, Phe, Thr or Val

<400> 3

Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Cys

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<210> 4

<211> 16

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<213> Artificial Sequence

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<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 4

Asn Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asn Ser Tyr

1

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15

<210> 5

<211> 16

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<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 5

Asp Trp Val Cys Glu Asn Lys Lys Asp Gln Trp Thr Cys Asn Leu Leu

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<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding
polypeptide

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Asn Trp Asp Cys Met Phe Gly Ala Glu Gly Trp Ala Cys Ser Pro Trp
1 5 10 15

<210> 7

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 7

Asp Trp Val Cys Glu Lys Thr Thr Gly Gly Tyr Val Cys Gln Pro Leu
1 5 10 15

<210> 8

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 8

Asn Trp Phe Cys Glu Met Ile Gly Arg Gln Trp Gly Cys Val Pro Ser
1 5 10 15

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<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 9

Asp Trp Val Cys Asn Phe Asp Gln Gly Leu Ala His Cys Phe Pro Ser
1 5 10 15

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<220>
 <223> Description of Artificial Sequence: parental
 domain for design of microprotein display library

<220>
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 <222> (1)..(12)
 <223> amino acid positions 4 and 9 are invariant Cys;
 all other positions Xaa are varied but not Cys, to
 provide a library of 2x10(8) different peptides
 based on the template sequence

<400> 10
 Xaa Xaa Xaa Cys Xaa Xaa Xaa Xaa Cys Xaa Xaa Xaa
 1 5 10

<210> 11
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 <212> PRT
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<220>
 <223> Description of Artificial Sequence: parental
 domain for design of microprotein display library

<220>
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 <222> (1)..(11)
 <223> amino acid positions 3 and 9 are invariant Cys;
 all other positions Xaa are varied but not Cys, to
 provide a library of 1x10(9) different peptides
 based on the template sequence

<400> 11
 Xaa Xaa Cys Xaa Xaa Xaa Xaa Xaa Cys Xaa Xaa
 1 5 10

<210> 12
 <211> 12

<212> PRT
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: parental
domain for design of microprotein display library

<220>

<221> VARIANT

<222> (1)..(12)

<223> amino acid positions 3 and 10 are invariant Cys;
all other positions Xaa are varied but not Cys, to
provide a library of 1×10^9 different peptides
based on the template sequence

<400> 12

Xaa Xaa Cys Xaa Xaa Xaa Xaa Xaa Xaa Cys Xaa Xaa
1 5 10

<210> 13

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: parental
domain for design of microprotein display library

<220>

<221> VARIANT

<222> (1)..(16)

<223> amino acid positions 4 and 13 are invariant Cys;
all other positions Xaa are varied but not Cys, to
provide a library of 2.5×10^8 different peptides
based on the template sequence

<400> 13

Xaa Xaa Xaa Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Cys Xaa Xaa Xaa
1 5 10 15

<210> 14

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: variable
sublibrary sequence used in designing focused
secondary library

<220>

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<222> (1)..(3)

<223> Xaa is any amino acid except Cys

<220>

<221> VARIANT

<222> (5)..(6)

<223> Xaa is any amino acid except Cys

<400> 14

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Xaa | Xaa | Xaa | Cys | Xaa | Xaa | Lys | Lys | Asp | Gln | Trp | Thr | Cys | Asn | Leu | Leu |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

<210> 15

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<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: variable
sublibrary sequence used in designing focused
secondary library

<220>

<221> VARIANT

<222> (5)..(9)

<223> Xaa is any amino acid except Cys

<400> 15

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| Asp | Trp | Val | Cys | Xaa | Xaa | Xaa | Xaa | Xaa | Gln | Trp | Thr | Cys | Asn | Leu | Leu |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

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sublibrary sequence used in designing focused
secondary library

<220>

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<222> (8)..(12)

<223> Xaa is any amino acid except Cys

<400> 16

Asp Trp Val Cys Glu Asn Lys Xaa Xaa Xaa Xaa Xaa Cys Asn Leu Leu
1 5 10 15

<210> 17

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<213> Artificial Sequence

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<223> Description of Artificial Sequence: variable
sublibrary sequence used in designing focused
secondary library

<220>

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<223> Xaa is any amino acid except Cys

<220>

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<222> (14)..(16)

<223> Xaa is any amino acid except Cys

<400> 17

Asp Trp Val Cys Glu Asn Lys Lys Asp Gln Xaa Xaa Cys Xaa Xaa Xaa
1 5 10 15

<210> 18

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: variable
sublibrary sequence used in designing focused
secondary library

<220>

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<222> (6)..(7)

<223> Xaa is any amino acid except Cys

<220>

<221> VARIANT

<222> (9)

<223> Xaa is any amino acid except Cys

<220>

<221> VARIANT

<222> (12)

<223> Xaa is any amino acid except Cys

<220>

<221> VARIANT

<222> (15)

<223> Xaa is any amino acid except Cys

<400> 18

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| Asp | Trp | Val | Cys | Glu | Xaa | Xaa | Lys | Xaa | Gln | Trp | Xaa | Cys | Asn | Xaa | Leu |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

<210> 19

<211> 16

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<220>

<223> Description of Artificial Sequence: variable
sublibrary sequence used in designing focused
secondary library

<220>

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<222> (5)..(7)

<223> Xaa is any amino acid except Cys

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<222> (9)

<223> Xaa is any amino acid except Cys

<220>

<221> VARIANT

<222> (12)

<223> Xaa is any amino acid except Cys

<400> 19

Asn Trp Val Cys Xaa Xaa Xaa Lys Xaa Gln Trp Xaa Cys Asn Ser Tyr
1 5 10 15

<210> 20

<211> 16

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<220>

<223> Description of Artificial Sequence: variable
sublibrary sequence used in designing focused
secondary library

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<222> (3)

<223> Xaa is any amino acid except Cys

<220>

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<222> (14)..(16)

<223> Xaa is any amino acid except Cys

<400> 20

Xaa Trp Xaa Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Xaa Xaa Xaa
1 5 10 15

<210> 21

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: isolate of
TN10/9 library found not to bind CEA

<400> 21

Asn Trp Arg Cys Lys Leu Phe Pro Arg Tyr Pro Tyr Cys Ser Ser Trp
1 5 10 15

<210> 22
 <211> 15
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: isolate of
 TN10/9 library found not to bind CEA

<400> 22
 Arg Tyr Cys Glu Phe Phe Pro Trp Ser Leu His Cys Gly Arg Pro
 1 5 10 15

<210> 23
 <211> 16
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 <213> Artificial Sequence

<220>
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 amino acid positions in first family of CEA
 binding peptides

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 <223> X is Asn, Leu, Met or Phe

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 <222> (9)
 <223> X is Arg, Asn, Asp, Glu or Gly

<220>
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 <222> (12)
 <223> X is Ala, Gly, His, Phe, Thr or Val

<220>
 <221> VARIANT
 <222> (15)

<223> X is Arg, Leu, Pro or Ser

<400> 23

Asp Trp Val Cys Glu Xaa Xaa Lys Xaa Gln Trp Xaa Cys Asn Xaa Leu
1 5 10 15

<210> 24

<211> 27

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic CEA
binding peptide with C-terminal immobilization
sequence

<400> 24

Ser Asn Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asn Ser
1 5 10 15

Tyr Ala Pro Gly Gly Glu Gly Gly Gly Ser Lys
20 25

<210> 25

<211> 27

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic CEA
binding peptide with C-terminal immobilization
sequence

<400> 25

Ser Asp Trp Val Cys Glu Asn Lys Lys Asp Gln Trp Thr Cys Asn Leu
1 5 10 15

Leu Ala Pro Gly Gly Glu Gly Gly Gly Ser Lys
20 25

<210> 26

<211> 27

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic CEA
binding peptide with C-terminal immobilization
sequence

<400> 26

Ser Asn Trp Asp Cys Met Phe Gly Ala Glu Gly Trp Ala Cys Ser Pro
1 5 10 15

Trp Ala Pro Gly Gly Glu Gly Gly Gly Ser Lys
20 25

<210> 27

<211> 27

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic CEA
binding peptide with C-terminal immobilization
sequence

<400> 27

Ser Asp Trp Val Cys Glu Leu Thr Thr Gly Gly Tyr Val Cys Gln Pro
1 5 10 15

Leu Ala Pro Gly Gly Glu Gly Gly Gly Ser Lys
20 25

<210> 28

<211> 10

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: C-terminal
sequence for immobilizing peptides

<400> 28

Ala Pro Gly Gly Glu Gly Gly Gly Ser Lys
1 5 10

<210> 29

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: template
sequence for sublibrary used in construction of
focused secondary display library

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<222> (1)..(3)

<223> X is any amino acid except Cys

<220>

<221> VARIANT

<222> (5)..(6)

<223> X is any amino acid except Cys

<400> 29

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| Xaa | Xaa | Xaa | Cys | Xaa | Xaa | Lys | Lys | Asp | Gln | Trp | Thr | Cys | Asn | Leu | Leu |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

<210> 30

<211> 16

<212> PRT

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<220>

<223> Description of Artificial Sequence: template
sequence for sublibrary used in construction of
focused secondary display library

<220>

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<222> (5)..(9)

<223> X is any amino acid except Cys

<400> 30

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| Asp | Trp | Val | Cys | Xaa | Xaa | Xaa | Xaa | Xaa | Gln | Trp | Thr | Cys | Asn | Leu | Leu |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

<210> 31

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: template
sequence for sublibrary used in construction of
focused secondary display library

<220>

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<222> (8)..(12)

<223> X is any amino acid except Cys

<400> 31

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asp | Trp | Val | Cys | Glu | Asn | Lys | Xaa | Xaa | Xaa | Xaa | Xaa | Cys | Asn | Leu | Leu |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

<210> 32

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<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: template
sequence for sublibrary used in construction of
focused secondary display library

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<222> (11)..(12)

<223> X is any amino acid except Cys

<220>

<221> VARIANT

<222> (14)..(16)

<223> X is any amino acid except Cys

<400> 32

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asp | Trp | Val | Cys | Glu | Asn | Lys | Lys | Asp | Gln | Xaa | Xaa | Cys | Xaa | Xaa | Xaa |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

<210> 33

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: template
sequence for sublibrary used in construction of
focused secondary display library

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<222> (6)..(7)
<223> X is any amino acid except Cys

<220>
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<222> (9)
<223> X is any amino acid except Cys

<220>
<221> VARIANT
<222> (12)
<223> X is any amino acid except Cys

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<222> (15)
<223> X is any amino acid except Cys

<400> 33
Asp Trp Val Cys Glu Xaa Xaa Lys Xaa Gln Trp Xaa Cys Asn Xaa Leu
1 5 10 15

<210> 34
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: template
sequence for sublibrary used in construction of
focused secondary display library

<220>
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<222> (5)..(7)
<223> X is any amino acid except Cys

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<223> X is any amino acid except Cys

<220>
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<222> (12)

<223> X is any amino acid except Cys

<400> 34

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asn | Trp | Val | Cys | Xaa | Xaa | Xaa | Lys | Xaa | Gln | Trp | Xaa | Cys | Asn | Ser | Tyr |
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<210> 35

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: template
sequence for sublibrary used in construction of
focused secondary display library

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<223> X is any amino acid except Cys

<220>

<221> VARIANT

<222> (3)

<223> X is any amino acid except Cys

<220>

<221> VARIANT

<222> (14)..(16)

<223> X is any amino acid except Cys

<400> 35

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Xaa | Trp | Xaa | Cys | Asn | Leu | Phe | Lys | Asn | Gln | Trp | Phe | Cys | Xaa | Xaa | Xaa |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

<210> 36

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: family of CEA
binding polypeptides

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<222> (1)

<223> Xaa is Asp, Asn, Ala or Ile

<220>

<221> VARIANT

<222> (3)

<223> Xaa is Val, Ile, Met, Tyr, Phe, Pro or Asp

<220>

<221> VARIANT

<222> (5)

<223> Xaa is Asn, Glu or Asp

<220>

<221> VARIANT

<222> (6)

<223> Xaa is Leu, Phe, Tyr, Trp, Val Met, Ile or Asn

<220>

<221> VARIANT

<222> (7)

<223> Xaa is Phe, Leu, Asp, Glu, Ala, Ile, Lys, Asn,
Ser, Val, Trp or Tyr

<220>

<221> VARIANT

<222> (8)

<223> Xaa is Lys, Phe, Asp, Gly, Leu, Asn or Trp

<220>

<221> VARIANT

<222> (9)

<223> Xaa is Asn, Pro, Phe, Gly, Asp, Ala, Ser, Glu, Gln
or Trp

<220>

<221> VARIANT

<222> (10)

<223> Xaa is Gln or Lys

<220>

<221> VARIANT

<222> (12)

<223> Xaa is Phe, Thr, Met, Ser, Ala, Asn, Val, His,
Ile, Pro, Trp or Tyr

<220>

<221> VARIANT
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 <223> Xaa is Asn, Asp, Glu, Pro, Gln or Ser

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 <222> (15)
 <223> Xaa is Val, Leu, Ile, Pro, Ala, Gln, Ser, Met,
 Glu,Thr, Lys or Trp

<220>
 <221> VARIANT
 <222> (16)
 <223> Xaa is Leu, Met, Val, Tyr, Ala, Ile, Trp, His,
 Pro, Gln, Glu, Phe, Lys or Arg

<400> 36
 Xaa Trp Xaa Cys Xaa Xaa Xaa Xaa Xaa Trp Xaa Cys Xaa Xaa Xaa
 1 5 10 15

<210> 37
 <211> 16
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: CEA binding
 polypeptide

<400> 37
 Asp Trp Met Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Leu Met
 1 5 10 15

<210> 38
 <211> 16
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 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: CEA binding
 polypeptide

<400> 38
 Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Leu Met
 1 5 10 15

<210> 39
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 39
Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Gln Met
1 5 10 15

<210> 40
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 40
Asn Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Gln Glu
1 5 10 15

<210> 41
<211> 16
<212> PRT
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<220>
<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 41
Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Gln Val Lys
1 5 10 15

<210> 42
<211> 16
<212> PRT
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<220>

<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 42

Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Val Met
1 5 10 15

<210> 43

<211> 16

<212> PRT

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<220>

<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 43

Asp Trp Met Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Gln Ile
1 5 10 15

<210> 44

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 44

Ile Trp Asp Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Pro Ala Pro
1 5 10 15

<210> 45

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: CEA binding
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<400> 45

Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Ile Arg

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<210> 46

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<220>

<223> Description of Artificial Sequence: CEA binding
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<400> 46

Asp Trp Met Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Val Val

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<210> 47

<211> 16

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<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 47

Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Ala Ile

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<210> 48

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 48

Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Met Ala

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<210> 49

<211> 16

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<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 49

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| Asp | Trp | Val | Cys | Glu | Phe | Leu | Lys | Met | Gln | Trp | Ala | Cys | Asn | Val | Leu |
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<210> 50

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 50

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| Asp | Trp | Val | Cys | Asn | Leu | Phe | Lys | Asn | Gln | Trp | Phe | Cys | Asn | Val | Met |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

<210> 51

<211> 16

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<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 51

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| Ala | Trp | Pro | Cys | Asn | Leu | Phe | Lys | Asn | Gln | Trp | Phe | Cys | Pro | Pro | Gln |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

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<211> 16

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<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 52

Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Val Leu
1 5 10 15

<210> 53

<211> 16

<212> PRT

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<220>

<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 53

Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Lys Trp
1 5 10 15

<210> 54

<211> 16

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<223> Description of Artificial Sequence: CEA binding
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<400> 54

Asp Trp Val Cys Glu Trp Leu Lys Met Gln Trp Ala Cys Asn Met Leu
1 5 10 15

<210> 55

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: CEA binding
polypeptide

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Asp Trp Val Cys Asp Phe Phe Phe Asn Gln Trp Thr Cys Asn Leu Leu
1 5 10 15

<210> 56

<211> 16
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1 5 10 15

<210> 57
<211> 16
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polypeptide

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Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Ala Trp
1 5 10 15

<210> 58
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polypeptide

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Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Val Trp
1 5 10 15

<210> 59
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Asp Trp Val Cys Glu Tyr Phe Lys Asn Gln Trp Phe Cys Asn Val Leu
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<211> 16

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1 5 10 15

<210> 61

<211> 16

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Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asn Pro Phe
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<211> 16

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polypeptide

<400> 62

Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Val Gln
1 5 10 15

<210> 63
<211> 16
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polypeptide

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Asp Trp Val Cys Asn Leu Phe Phe Gly Gln Trp Thr Cys Asn Leu Leu
1 5 10 15

<210> 64
<211> 16
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polypeptide

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Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Glu Ala His
1 5 10 15

<210> 65
<211> 16
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Asp Trp Val Cys Glu Leu Val Lys Ala Gln Trp Tyr Cys Asn Ile Leu
1 5 10 15

<210> 66
<211> 16
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polypeptide

<400> 66

Asn Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Thr Val
1 5 10 15

<210> 67

<211> 16

<212> PRT

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polypeptide

<400> 67

Asp Trp Val Cys Glu Phe Tyr Lys Ser Gln Trp Asn Cys Asn Ile Leu
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polypeptide

<400> 68

Asp Trp Val Cys Glu Trp Phe Lys Pro Gln Trp Phe Cys Asn Pro Leu
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<210> 69

<211> 16

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polypeptide

<400> 69

Asp Trp Tyr Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Val Leu

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<211> 16

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<210> 71

<211> 16

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Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asn Glu Ala
1 5 10 15

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Asp Trp Val Cys Asn Trp Glu Leu Phe Gln Trp Thr Cys Asn Leu Leu
1 5 10 15

<210> 73

<211> 16

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polypeptide

<400> 73

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| Asp | Trp | Val | Cys | Asn | Leu | Phe | Lys | Asn | Gln | Trp | Phe | Cys | Asp | Gln | Val |
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<210> 74

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 74

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| Asp | Trp | Val | Cys | Asn | Leu | Phe | Lys | Asn | Gln | Trp | Phe | Cys | Asp | Val | Pro |
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<210> 75

<211> 16

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polypeptide

<400> 75

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| Asp | Trp | Val | Cys | Glu | Phe | Phe | Lys | Gln | Gln | Trp | Phe | Cys | Asn | Val | Leu |
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<211> 16

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<400> 76

Asp Trp Val Cys Glu Phe Phe Lys Asp Gln Trp Ser Cys Asn Val Leu
1 5 10 15

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<211> 16

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polypeptide

<400> 77

Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Ser Leu
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<210> 78

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<210> 79

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1 5 10 15

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Asp Trp Val Cys Glu Phe Ile Lys Asn Gln Trp Met Cys Asn Val Leu
1 5 10 15

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<400> 82
Asp Trp Val Cys Glu Tyr Glu Lys Asp Gln Trp Ser Cys Asn Ile Leu
1 5 10 15

<210> 83
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polypeptide

<400> 83

Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Thr Leu
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<210> 84

<211> 16

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polypeptide

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Asp Trp Tyr Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Val Tyr
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<210> 85

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polypeptide

<400> 85

Asp Trp Phe Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Ser Pro Ile
1 5 10 15

<210> 86

<211> 16

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<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 86

Asp Trp Val Cys Glu Phe Phe Lys Lys Gln Trp Phe Cys Asn Leu Leu
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<210> 87
<211> 16
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polypeptide

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Asn Trp Val Cys Asp Val Leu Lys Trp Gln Trp Pro Cys Asn Ser Tyr
1 5 10 15

<210> 88
<211> 16
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polypeptide

<400> 88
Asp Trp Val Cys Glu Tyr Asp Lys Gly Gln Trp His Cys Asn Ile Leu
1 5 10 15

<210> 89
<211> 16
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polypeptide

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Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Gln Gln His
1 5 10 15

<210> 90
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polypeptide

<400> 90

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| Asp | Trp | Val | Cys | Asn | Trp | Leu | Trp | Gly | Gln | Trp | Thr | Cys | Asn | Leu | Leu |
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<210> 91

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polypeptide

<400> 91

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| Asp | Trp | Val | Cys | Glu | Met | Phe | Lys | Lys | Gln | Trp | Val | Cys | Asn | Pro | Leu |
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<210> 92

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<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 92

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| Asp | Trp | Ile | Cys | Asn | Leu | Phe | Lys | Asn | Gln | Trp | Phe | Cys | Gly | Pro | Leu |
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<210> 93

<211> 16

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<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 93

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| Asp | Trp | Val | Cys | Glu | Val | Ile | Lys | Asp | Gln | Trp | Val | Cys | Asn | Pro | Leu |
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polypeptide

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Asp Trp Val Cys Glu Asn Lys Asn Phe Lys Trp Phe Cys Asn Leu Leu
1 5 10 15

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polypeptide

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1 5 10 15

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polypeptide

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Asn Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Glu Trp Ala
1 5 10 15

<210> 97
<211> 16
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polypeptide

<400> 97

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asn | Trp | Val | Cys | Asp | Tyr | Trp | Lys | Pro | Gln | Trp | Phe | Cys | Asn | Ser | Tyr |
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<210> 98

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polypeptide

<400> 98

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| Asp | Trp | Tyr | Cys | Asn | Leu | Phe | Lys | Asn | Gln | Trp | Phe | Cys | Asp | Leu | Val |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

<210> 99

<211> 16

<212> PRT

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polypeptide

<400> 99

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asn | Trp | Val | Cys | Asn | Leu | Phe | Lys | Asn | Gln | Trp | Phe | Cys | Asp | Glu | Met |
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<210> 100

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polypeptide

<400> 100

Asp Trp Val Cys Glu Leu Phe Lys Pro Gln Trp Phe Cys Asn Ile Leu
1 5 10 15

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polypeptide

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1 5 10 15

<210> 102

<211> 16

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polypeptide

<400> 102

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<210> 103

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<223> Description of Artificial Sequence: CEA binding
polypeptide

<400> 103

Asn Trp Val Cys Glu Trp Leu Lys Pro Gln Trp Trp Cys Asn Ser Tyr
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<210> 104

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polypeptide

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Asp Trp Val Cys Glu Phe Phe Lys Pro Gln Trp Met Cys Asn Ile Leu
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polypeptide

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1 5 10 15

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polypeptide

<400> 106
Asp Trp Val Cys Glu Phe Phe Gly Met Gln Trp Thr Cys Asn Leu Leu
1 5 10 15

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polypeptide

<400> 107

Asp Trp Val Cys Glu Tyr Ala Lys Phe Gln Trp Ile Cys Asn Ile Leu
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<210> 108

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<212> PRT

<213> Artificial Sequence

<400> 108

Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asn Glu Ala
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<210> 109

<211> 16

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16-mer microprotein analogues

<400> 109

Asp Trp Val Cys Glu Tyr Phe Lys Asn Gln Trp Phe Cys Asp Thr Leu
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<210> 110

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16-mer microprotein analogues

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<221> VARIANT

<222> (3)

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<220>

<221> VARIANT

<222> (4)

<223> X is Phe, Leu, Asp, Glu, Ala, Ile, Lys, Asn, Ser,
Val, Trp, Tyr, Gly or Thr

<220>

<221> VARIANT

<222> (5)

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or Thr

<220>

<221> VARIANT

<222> (6)

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Trp, His, Arg, Met, Val or Leu

<220>

<221> VARIANT

<222> (7)

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<221> VARIANT

<222> (8)

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<220>

<221> VARIANT

<222> (9)

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Pro, Trp, Tyr, Gly, Leu or Glu

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1

5

10

<210> 111

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: synthetic

16-mer microprotein analogues

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<223> X is Trp

<220>

<221> VARIANT

<222> (3)

<223> X is Val, Ile, Met, Tyr, Phe, Pro or Asp

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<221> VARIANT

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<220>

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<223> X is Leu, Phe, Tyr, Trp, Val, Met, Ile, or Asn

<220>

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<223> X is Phe, Leu, Asp, Glu, Ala, Ile, Lys, Asn, Ser,
Val, Trp, Tyr, Gly, or Thr

<220>

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<223> X is Lys, Phe, Asp, Gly, Leu, Asn, Trp, Ala, Gln,
or Thr

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Trp, His, Arg, Met, Val, or Leu

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<220>

<221> VARIANT

<222> (11)

<223> X is Trp, Tyr or Ala

<220>

<221> VARIANT

<222> (12)

<223> X is Phe, Thr, Met, Ser, Ala, Asn, Val, His, Ile,
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<222> (14)

<223> X is Asn, Asp, Glu, Pro, Gln, Ser, Phe, or Val

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<221> VARIANT

<222> (15)

<223> X is Val, Leu, Ile, Pro, Ala, Gln, Ser, Met, Glu,
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<222> (16)

<223> X is Leu, Met, Val, Tyr, Ala, Ile, Trp, His, Pro,
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<400> 111

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<210> 112

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

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16-mer microprotein analogues

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16-mer microprotein analogues

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16-mer microprotein analogues

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16-mer microprotein analogues

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16-mer microprotein analogues

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16-mer microprotein analogues

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16-mer microprotein analogues

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 16-mer microprotein analogues

<400> 121
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 16-mer microprotein analogues

<400> 122
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<210> 123
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16-mer microprotein analogues

<400> 123

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| Asp | Trp | Val | Cys | Glu | Phe | Ile | Lys | Asp | Gln | Trp | Tyr | Cys | Asp | Leu | Ala |
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<212> PRT

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

<400> 124

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| Asp | Trp | Val | Cys | Asn | Leu | Phe | Lys | Asn | Gln | Trp | Phe | Cys | Asp | Val | Val |
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<212> PRT

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

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| Asp | Trp | Val | Cys | Glu | Trp | Leu | Lys | Met | Gln | Trp | Ala | Cys | Asn | Val | Leu |
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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

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16-mer microprotein analogues

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

<400> 129

Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Val Met
1 5 10 15

<210> 130

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

<400> 130

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| Asp | Trp | Val | Cys | Glu | Trp | Phe | Lys | Ala | Gln | Trp | Phe | Cys | Asn | Met | Leu |
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<210> 131

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

<400> 131

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

<400> 132

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| Asp | Trp | Met | Cys | Asn | Leu | Phe | Lys | Asn | Gln | Trp | Phe | Cys | Asp | Val | Gln |
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<210> 133

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<223> Description of Artificial Sequence: synthetic

16-mer microprotein analogues

<400> 133

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<211> 16

<212> PRT

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

<400> 134

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<211> 16

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

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16-mer microprotein analogues

<400> 136

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

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16-mer microprotein analogues

<400> 138

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

<400> 139

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

<400> 140

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<210> 141

<211> 16

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

<400> 141

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<210> 142

<211> 16

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

<400> 142

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<210> 143

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

<400> 143

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 16-mer microprotein analogues

<400> 144
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<210> 145
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 16-mer microprotein analogues

<400> 145
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 16-mer microprotein analogues

<400> 146
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 1 5 10 15

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

<400> 147

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| Asp | Trp | Val | Cys | Glu | Phe | Ile | Lys | Ser | Gln | Trp | Phe | Cys | Asn | Val | Leu |
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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

<400> 148

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

<400> 149

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asp | Trp | Val | Cys | Glu | Ile | Val | Lys | Asn | Gln | Trp | Ile | Cys | Asn | Pro | Leu |
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<210> 150

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

<400> 150

Asp Trp Val Cys Glu Phe Phe Lys Asp Gln Trp Phe Cys Asn Ile Leu
1 5 10 15

<210> 151

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<223> Description of Artificial Sequence: synthetic
16-mer microprotein analogues

<400> 151

Asp Trp Val Cys Glu Phe Leu Lys Met Gln Trp Ala Cys Asn Val Leu
1 5 10 15